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Pocket Electronic Dictionaries in Japan: User Perspectives

1. Introduction

With the advent of computer technology and the Internet, we now enjoy various resources in electronic form. Dictionaries are not an exception. We can access the entire *Oxford English Dictionary* online, which is constantly updated. Not only the *OED* but the whole selections of dictionaries published by Oxford University Press are now serviced online if you subscribe to their service (the Oxford Reference Online), which covers all major titles of English monolingual dictionaries, bilingual dictionaries, thesauruses, quotations, subject references and encyclopedias. Other publishers such as Cambridge University Press or Pearson Longman do the same. Most of these services are via the Web. Thanks to a very rapid Internet connection, people are now free from stress in accessing resources via the Net. Also the amount of information processed, including sound and image files, seems to be boundless due to the expansion of the Internet band width.

Along with all these wonderful web resources, we have a very specific type of electronic resources in Japan: hand-held pocket electronic dictionaries. Pocket electronic dictionaries have been a somewhat unique development in Japan until quite recently, when some other Asian manufacturers started producing devices similar to ours. Carrying a paper dictionary with you had always been a problem; it tended to be bulky and heavy. This made people carry pocket, concise paper dictionaries, which, on the other hand, were very limited in the coverage of the information required. Therefore, it was only natural to dream of an electronic gadget containing the entire volume of an unabridged dictionary. Major Japanese electronics companies such as CASIO, SEIKO, SHARP and SONY have been competing to introduce a pocket electronic dictionary to the market by forming links to domestic dictionary publishers such as Kenkyusha, Sanseido, Taishukan, Shogakukan and also some ELT publishers like Longman, OUP, CUP, HarperCollins and Macmillan. Since the first introduction of the model produced by SHARP in the late 1970s, Japanese manufacturers have improved the capacity and functionality of pocket electronic dictionaries for decades. About a decade ago, Sharpe (1995) introduced this new trend, and since then there has been a very clear tendency for this type of dictionaries to dominate the market and for people in Japan to prefer to buy electronic dictionaries to paper versions. The market has been very successful and more than twenty to thirty different models have always been on display at huge electrical stores.

This chapter introduces this unique variety of reference tools developed in Japan from both historical as well as pedagogical perspectives. Especially, after major functions of pocket electronic dictionaries are introduced, I discuss in detail how user reference behaviour has been modified by the use of electronic dictionaries in the context of English language teaching in our country.

2. A brief history

Let us first have a brief overview of the development of pocket electronic dictionaries in Japan. The first pocket electronic dictionary in Japan dates back to 1979, when Sharp produced a product called IQ-3000. It contained 2,800 entries for the English-Japanese section, and 5,000 entries for Japanese-English. It had a tiny display (16 letters in 1 line) and could only display Katakana (one of the two types of Japanese alphabets). That was about the time that American companies like Texas Instruments produced a slightly larger model, but the capability of either was extremely limited.

The second generation was much more ambitious. In 1987, SANYO released a model called *Denjirin*, which means literally "Electronic Dictionary", containing 35,000 English-Japanese entries only. And yet, back then, it was a great improvement because it had a function of Kanji display. Despite the superior display functionality, it still contained the list of English entries and their translation equivalents only. It provided no examples, no phrasal verbs, or no idioms.

The third generation was noteworthy in the sense that it was the first to contain full volumes of paper dictionaries in a machine. In 1991, SEIKO TR-700 was out, which had three popular dictionaries, *Kenkyusha's English-Japanese Dictionary*, and *Kenkyusha's Japanese-English Dictionary*, and *Roget's Thesaurus*. This TR-700 sold extremely well and since then it has become a major trend for electronic dictionaries to contain full-contents of paper dictionaries.

The 4th generation features both 'multi-volume' and 'professional' versions. With the increasing power of IC memory capacities, it became possible to include more and more titles in one machine. The price went up accordingly, because royalty was payable for each title included. Still, the products containing more titles sold better. People preferred more comprehensive, all-in-one models.

3. The market

3.1. The market size

Let us look at the market size of electronic dictionaries in Japan to understand how popular they are. Table 1 shows the sales statistics as of 2007. In 1997, the annual sales of electronic dictionaries were 300,000 units, worth approximately 16 million US dollars. Ten years later, in 2007, the total number of units sold was close to 3 million, which amounts to about 483.7 million US dollars in sales. Since the population of Japan is around 120 million, one can see the relative size of the market.

Year	Units sold	Increase from previous year (%)	Sales total (JPY)	Increase from previous year (%)
1996	51,000		101,000,000	
1997	302,000	592.2	1,602,000,000	1586.1
1998	550,000	182.1	3,295,000,000	205.7
1999	1,561,000	283.8	9,577,000,000	290.7
2000	2,660,000	170.4	16,021,000,000	167.2
2001	2,174,000	81.7	15,816,000,000	98.6
2002	1,909,000	87.8	18,120,000,000	114.7
2003	2,088,000	109.4	26,907,000,000	146.1
2004	2,525,000	120.9	34,641,000,000	126.3
2005	2,558,000	101.3	35,560,000,000	102.3
2006	2,673,000	104.5	38,852,000,000	109.4
2007	2,971,000	111.1	48,371,000,000	123.9

Table 1. Sales statistics for the pocket electronic dictionary market in Japan. (Source: Association for Business and IT system industries in Japan)

There was a sharp increase in the number of units sold from 1996 to 2000, when the so-called 3rd-generation 'full-contents' standard model appeared. This was about the time when people recognized the value of pocket electronic dictionaries, compared to paper versions. Electronic versions were beginning to make an impact. Then the units sold each year slightly decreased (from 2000 to 2003), and the number of the units sold has been around 2.5 million annually since then. Despite the fact that there is no dramatic increase in the number of units sold, the total amount of sales has been increasing dramatically. This is due to the shift of the trend; the recent models are designed to contain multi-volumes and targeted for professional use and thus the individual retail price per unit increased, which resulted in the sharp rise in the sales figures.

3.2. Major manufacturers

There are four major manufacturers of pocket electronic dictionaries in Japan; CASIO, SEIKO Instruments, SHARP and SONY. The most active manufacturer as well as the market leader is CASIO. They produce a broad line of products, ranging from all-inclusive professional models, models for high school students preparing for the entrance examination to university, to the models for foreign languages other than English. They started the competition with SEIKO Instruments in terms of the number of different titles in one machine. A few years ago, the number exceeded 100 titles, and they decided to stop the competition, claiming that the number 100 would be sufficient.

The next major manufacturer is SEIKO Instruments. They also produce various types of models and compete with CASIO all the time. Recently, however, SEIKO Instruments has focused on the models for professional use. For instance, they have produced a model especially for medical staff, which contains several unabridged medical dictionaries, both monolingual and bilingual, together with major Japanese monolingual and English bilingual dictionaries.

The other two companies, SHARP and SONY, produce a limited line of models, focusing on specific target users. SHARP, for instance, is very famous for its colour LDC panel. They emphasize full-colour contents and some other additive values like digital TV functions and PDA all in one. They are primarily targeting home users instead of professionals. SONY used to manufacture a quite unique model called *Data Discman*, which was actually an empty dictionary software processor and people could insert discs and replace the contents for themselves. The idea itself was quite innovative in the 1990s, but it did not sell as well as they expected, thus the entire line of products was abandoned.

3.3. Asian competitors

Until recently Japanese manufacturers were the only ones that produced pocket electronic dictionaries on such a wide market. These days, however, other Asian companies have started to manufacture their own products, some of which are more advanced than Japanese models in terms of its multimedia extendibility and hardware specifications. For instance, Besta in Taiwan produces full-colour models with audio (MP3) and video (3-D animation) functions. GSL in Hong Kong also produces multi-volume, full-contents models with a full-colour LDC panel, a translation engine, and multimedia edutainment. Reigncom Limited in Korea produces very stylish models with many additional functions such as PDF/CSV/Text viewer, USB2.0, and MP3.

Overall, pocket electronic dictionaries in Japanese are superior to their Asian competitors in terms of dictionary contents; the Japanese bilingual dictionaries are very high in quality, which makes a difference in the quality of information provided. On the other hand, other Asian products are superior to Japanese models in their extendibility, especially linking functions to audio-visual information via USB or MP3, other NLP tools such as translation or text-to-speech engines.

4. Types of pocket electronic dictionaries

4.1. Previous studies

For the purpose of examining different types of pocket electronic dictionaries in Japan in more detail, let us review some of the classifications of electronic dictionaries in previous studies. Martin (1992), for instance, made the following classifications: (1) dictionaries for human users, (2) computer-based dictionaries, (3) machine-readable dictionaries, (4) lexical/term banks, (5) machine dictionaries, (6) lexical databases, and (7) artificial intelligence lexicons. As you can see, his classification is entirely based on the concept of natural language processing, distinguishing the data accessed by human users (e.g. category 1) and computers (categories 2-7). As De Schryver (2003: 147) mentioned, it is in Japan that the first dedicated electronic dictionary typologies have been developed. Ide (1993, cited in Sharpe 1995), for instance, focuses on electronic bilingual dictionaries (EBDs) only and differentiates between (1) specific EBDs, (2) electronic notebooks, (3) CD-ROM EBDs, and (4) ED software. His classification was based solely on hard- and software, so some of the concepts are outdated. Sharpe (1995) added two more categories to Ide's, namely, (5) floppy-disk based portable EBDs, and (6) EBDs with hand-held optical character recognition scanners, but this again has been taken over by recent innovations of USB or Silicon disks.

De Schryver (2003: 150) developed a three-step dictionary typology, in which he suggested a typology based on the way in which dictionaries are accessed. He classified existing electronic dictionaries by answering the question of 'WHO accesses WHAT WHERE?' Figure 1 shows the typologies adapted from de Schryver (2003). His classification is fairly systematic and exhaustive for electronic dictionaries in general terms, but may still not be sufficient for classifying pocket electronic dictionaries in Japan. One of the missing factors is the type of target users. Whilst it is true that there is often a mismatch between dictionary publishers' intended purposes and users' actual use, we should keep in mind that dictionaries are to be designed and compiled with specific users in mind. This is also true of pocket electronic dictionaries in Japan. Here we will refine de Schryver's classification by specifying major types of users that these electronic dictionaries are targeting.

4.2. Classifications by target users

A close examination of the electronic dictionary manufacturers' web pages shows that they develop their products with specific target user groups in mind. There are basically the following five categories of prospective users:

(1) Home users
(2) Students
(3) Foreign language teachers/learners
(4) Professionals
(5) Elderly and handicapped people

Let us look at each category in detail to see how different models are intended to serve different user needs.

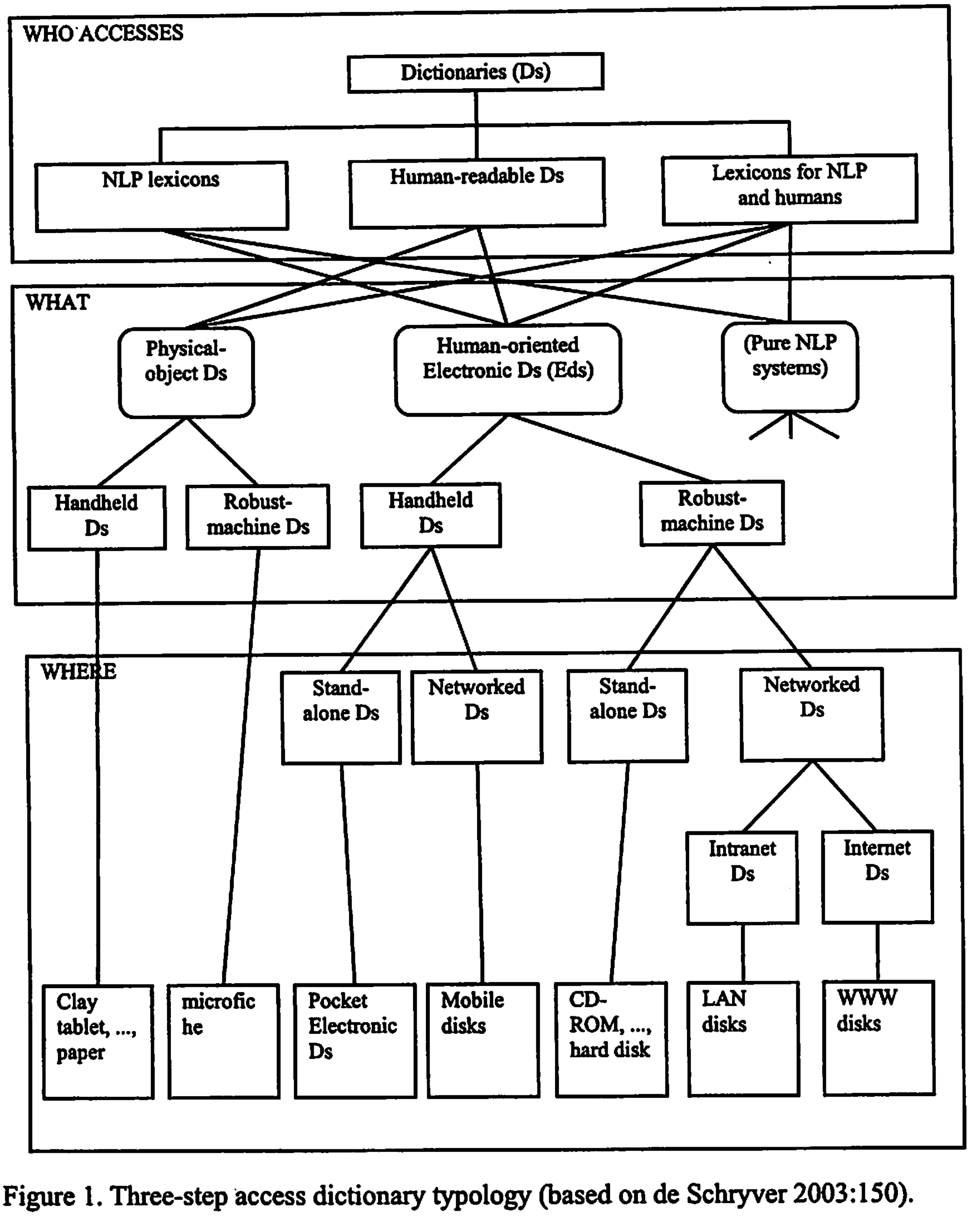

WHO ACCESSES
Dictionaries (Ds)
NLP lexicons
Human-readable Ds
Lexicons for NLP and humans
WHAT
Physical-object Ds
Human-oriented Electronic Ds (Eds)
(Pure NLP systems)
Handheld Ds
Robust-machine Ds
Handheld Ds
Robust-machine Ds
WHERE
Stand-alone Ds
Networked Ds
Stand-alone Ds
Networked Ds
Intranet Ds
Internet Ds
Clay tablet, ..., paper
microfiche
Pocket Electronic Ds
Mobile disks
CD-ROM, ..., hard disk
LAN disks
WWW disks

Figure 1. Three-step access dictionary typology (based on de Schryver 2003:150).

4.2.1. Home users

Home users are generally defined as ordinary members of the family, whose reference needs could vary from person to person, from situation to situation. Thus, the models targeting this user group usually contain reference books in a broad range of subject areas. CASIO's latest model (XD-SP6700), for instance, contains the one hundred titles shown in Table 2:

Category	Subcategory	Number of titles
Japanese	Unabridged Dictionary	1
	School Dictionary	1
	Kanji Character Dictionary	1
	Pronunciation Dictionary	1
	Katakana Dictionary	1
	Old Japanese Dictionary	1
	Dictionary of Proverbs	1
	Idiom Dictionary	1
English	English-Japanese Dictionary (96,000 entries)	1
	Japanese-English Dictionary (90,000 entries)	1
	Monolingual Learner's Dictionary (OALD)	1
	Spelling Dictionary	1
	Dictionary of Synonyms	1
Learning in general	Dictionary of Japanese History	1
	Dictionary of Japanese Literature	1
	Dictionary of Japanese Poetries	1
	Dictionary of World History	1
	Famous Japanese Novels	10
	Famous Japanese Poems	1
	Famous English Speeches and Proverbs	1
	Dictionary of Japanese Classics	1
	Dictionary of Japanese Famous Poetries	1
	Famous Japanese Classics	11
	Kanji Drills	5
Business & work	Dictionary of Computers	1
	Dictionary of Abbreviations in Electronics	1
	Dictionary of New Words (various subjects)	8
	Business Keywords	1
	Current News English	1
	Guide to work abroad	1

Daily life	Encyclopedia Britannica	1
	Mypedia (Japanese encyclopedia)	1
	Japanese Daily Words	1
	Funny Stories 1000	1
	Japanese Constitutions	1
	Dictionary of Quizzes	1
	What's Wrong with your Japanese?	2
	Dictionary of Manners	1
	How to Write Good Letters	1
	How to Write Good Speeches	1
	Encyclopedia of Home Medicine	1
	Encyclopedia of Dogs and Cats	1
	Guide to Medicine	1
	Guide to Women's Diseases	1
	Guide to Chinese Medicine	1
	Dictionary of Health Supplements	1
	Guide to Medical Check-up	1
	Medical Guide to Foods	1
	How to Write Good Haiku (Japanese poetry)	1
	Haiku Collections	1
	Companions to Wine Tasting	1
	Guide to Movies	1
	Glossaries of Sport Terms	1
	Japanese Crosswords	1
	English Crosswords	1
	Japanese Common Sense	4
English conversation & travel	Travel English	3
	Business English	2
	World Cuisines	1
	Drugs in America	1
	Travel Guide to Foreign Languages	7
	How to survive in foreign countries	8
Others	Chinese pronunciation guide	1
	Listening Practice in English	1
	Mathematical Puzzles	1
	Japanese thematic dictionary	1
	Mypedia topic indexes	1

Table 2. The titles of dictionaries available in CASIO XD-SP6700.

As shown in Table 2, the model is all-inclusive in nature, ranging from a Japanese monolingual dictionary, an English travel guide to a guide to home medicine. This user category usually features a model based on 'the more, the better' principle. Titles are selected so as to reflect the general interests of the ordinary family. Also, this category includes bits of everything from the other categories; for instance, it contains materials for school subjects, reference books on common knowledge, business persons' how-to books and crossword puzzles.

4.2.2. Students

Students' models primarily feature the contents for secondary school students (year 7-12), especially those who prepare for an entrance examination to college. Compared to the home user model, the CASIO's latest student model (XD-SP4850) contains, in addition to fifty titles shared in both models, approximately 40 titles specially selected for secondary school students, ranging from popular English vocabulary wordbooks to glossaries of major school subjects (world history, Japanese history, economics, chemistry, biology, physics, among others). In this category, models are designed in such a way that they meet the needs of students whose primary interest is not foreign language only, but various other school subjects. It is an open question how much of these massive volumes of self-study materials are actually consulted, but here again students' attitude toward pocket electronic dictionaries in this category seems to be 'the more, the better'. They do not know what information would be really necessary, so they naturally look for all-inclusive types of dictionaries. This line of products has been very successful in Japan. Many high schools are now beginning to encourage freshmen to buy pocket electronic dictionaries particularly tuned to high school students as they enter school. CASIO provides special seminars for high school teachers to teach how to exploit the information in pocket electronic dictionaries to the full.

There are also university students' models, in which the learning materials for language proficiency tests such as TOEIC or TOEFL are very common. These models usually provide audio functions for the users to try listening comprehension tasks.

4.2.3. Foreign language teachers/learners

The third category plays a central role in the pocket electronic dictionary market. Especially, the models targeting English teachers and English-major students are most successful. SEIKO Instruments has been competing with CASIO in this market. Both produce a dozen of models featuring different contents. Interestingly, these models show quite similar design criteria; they contain several different titles of English bilingual dictionaries (English-Japanese and Japanese-English), among which they have more than one version of English-Japanese dictionaries: one is for general-purposes and contains more than 200,000 entries on average, and the other is a learner's dictionary containing 70,000 to 100,000 entries, but very detailed grammar and usage notes. A Japanese-English dictionary is, on the other hand, usually just in one volume. The factor distinguishing these models is a monolingual dictionary. Each model focuses on a particular dictionary brand; some feature Oxford dictionaries, and others focus on COBUILD or LONGMAN series. Since English teachers wish to keep all these varieties of English monolingual dictionaries, they tend to buy all the different models because of this.

These days, professional models (cf. 4.2.4.) for English university teachers have appeared, in which major English monolingual and bilingual dictionaries are contained in one. For instance, CASIO's XD-GP9700 contains the following monolingual dictionaries all in one model:

a) Oxford Dictionary of English
b) The New Oxford American Dictionary (2nd edition)
c) Oxford Thesaurus of English
d) Oxford Collocations Dictionary for students of English
e) Oxford Advanced Learner's Dictionary (7th edition)
f) Oxford Learner's Wordfinder Dictionary

Along with these titles, it also contains three unabridged English-Japanese dictionaries, two unabridged Japanese-English dictionaries and various other large terminological dictionaries. Now teachers and researchers can enjoy dozens of well-known dictionaries at their fingertips. Using various search functions discussed later, we can make the most use of the information in these resources across different titles, which is a strong advantage for professionals working in language.

4.2.4. Professionals and business persons

The fourth category targets people in the professions. SEIKO Instruments and CASIO especially emphasize medical professionals. SEIKO's SR-A10000, for example, is a special model for medical and health care professionals. It features the *Stedman's Medical Dictionary* and other monolingual and bilingual medical dictionaries, along with major English and Japanese dictionaries and the *Encyclopedia Britannica*. There are also models for business persons. Major target users are professional translators, persons working in international business, and ordinary business workers. For the former, full-contents professional models are recommended, while slim, easy-to-use models (cf. 4.2.5.) are also popular among the latter.

4.2.5. Elderly and handicapped people

The last category is rather unique to Japan. As regards the hardware specifications, these models are very simple ones. Large LDC panels, limited contents, fewer buttons, intelligible instruction keys, and large display fonts are all designed with elderly and handicapped people in mind. As baby-boomers are retiring, we have more and more middle-class, elderly people in Japan. They want to spend their time on vacation in foreign countries, so it is popular to buy electronic dictionaries for this purpose. The machines have to be simple, easy to use, and handy. Thus, each manufacturer tries to customize models for these groups of users.

4.3. Classifications by functions

Another factor affecting classifications of pocket electronic dictionaries is their functionality. De Schryver (2003) evaluated the features of electronic dictionaries from various perspectives and provided his own wish list. Here we are not concerned with missing functions; we would rather focus on the functionality already available, which helps distinguish one type of model from another.

4.3.1. Multi-volumes and multi-titles

It is obvious that pocket electronic dictionaries available on the current market contain more than a dozen different titles with full contents. The distinguishing feature is thus 'how many'. Some models contain approximately one hundred titles, based on 'the more, the better' principle. Others do not. The latter are usually more focused, featuring particular domains of reference works, and they are usually more expensive if they are for professionals. They could be less expensive if they are simple models for beginners.

4.3.2. Various search functions

Cerquiglini (cited in Pruvost 2000:188) argued that there are three phases of computer use in lexicography:

(1) Computer-assisted paper lexicography;
(2) Transfer of existing paper dictionaries to an electronic medium;
(3) Electronic dictionaries in their own right.

The situation of pocket electronic dictionaries in Japan is in the middle of phases (2) and (3). Whilst most contents for existing electronic dictionaries in Japan are taken from paper dictionaries, manufacturers try to develop the interface with which we can access the dictionary data in its own unique ways. Indeed, "from a user's perspective, the most innovative aspect of EDs is probably the retrieval system" (Nesi 2000: 839).

For instance, one of the new search functions is 'lemma search' and 'directional search', which is more or less similar to the 'fuzzy search' mentioned in de Schryver (2003:156). Until a few years ago, most pocket electronic dictionaries did not have a 'lemma search' function. It only searched for the exact orthographical form keyed in the search field. Now some advanced models by CASIO and SEIKO Instruments have this lemma search function. Thus, this advanced search mode can be a good distinguishing factor for the latest model. Another innovation is 'directional search'. It used to be the case that if you keyed in *go* and *for* together, it searched for all the instances that contained both *go* and *for* in the same sentence. It could be a phrase like *for you to go* while we wanted to search for the instances of *go for* only. This same problem also occurs in a CD-ROM version of *LDOCE4*. We need directionality in searching multiple terms. These days, however, advanced models by CASIO or SEIKO Instruments manage to do this directional search.

Another innovative function is 'multi-access' (de Schryver 2003: 156). De Schryver gave more stars (i.e. positive feedback) to CD-ROM dictionaries for this, but we do not agree. In the case of CD-ROM dictionaries, multi-access can only be possible across different parts of the same dictionary or a suite of dictionaries installed at the same time from the same CD. One cannot access the information from *LDOCE*, *OALD*, and *MEDAL* all at the same time. Pocket electronic dictionaries, however, can do this. The multi-search function can do the search all at once across more than 100 titles in the model. Of course, this is limited to the titles contained in the dictionary, but still powerful enough. This is also another function distinguishing current models from others.

4.3.3. Graphics

Most major pocket electronic dictionaries in Japan, especially made by CASIO and SEIKO Instruments, still use black and white panels. They claim that consulting a dictionary does not require information in colour. However, it is clear that this is not true any more. A dictionary such as *LDOCE* has started to provide entire pages in full colour and more and more dictionaries use collared headwords or icons. Major CD-ROM dictionaries are all in full colour now. This tendency is also seen for pocket electronic dictionaries. SHARP began to produce full-colour models. They have very strong technologies for collared TFT panels and have applied them for PDAs and pocket electronic dictionaries. They may not be as powerful as the models by CASIO or SEIKO Instruments in terms of the contents, but all full-colour displays are very attractive, especially for graphical images in an encyclopedia. They went on to provide a function to watch terrestrial digital broadcasting with a pocket electronic dictionary with a collared TFT panel, which will give added value to the model. The same kind of approach is taken by foreign companies from, for instance, Korea and Taiwan. Sooner or later, the entire market will shift toward collared panel displays, but at the moment, CASIO and SEIKO are not willing to do so because they have already spent so much money on other features and the additional cost for collared panels will push up a unit price dramatically, which they do not want.

4.3.4. Device extensions

One of the recent improvements with the hardware of a pocket electronic dictionary is its extendibility by way of such devices as USB memories, SD cards and Memory Sticks. For instance, SEIKO Instruments produce models (e.g. SR-S9000) that have SD slots, which make it possible for users to add more dictionary contents, user-defined dictionaries, exercise materials downloaded from SEIKO's web site, as well as simple plain texts. The SEIKO catalogue shows more than a dozen dictionary contents by SD card, such as the LONGMAN card, or the COBUILD card, which can install several titles of LONGMAN dictionaries in addition to the titles already available.

5. Evaluating pocket electronic dictionaries

So far, we have described the market and types of pocket electronic dictionaries in terms of their target user groups and functionality. Let us now turn to a more detailed evaluation of what kind of improvement has been made regarding the software and hardware design of pocket electronic dictionaries. Especially, since Sharpe (1995) wrote an article on the critical evaluation of EBDs (electronic bilingual dictionaries) in Japan about a decade ago, it would be interesting to review some of his comments and see how those aspects have been dealt with in later models. Also de Schryver (2003) made an exhaustive wish list for electronic dictionaries, which could serve as a very useful framework to evaluate the state of the art for pocket electronic dictionaries.

5.1. Sharpe (1995)

Sharpe (1995) reviewed electronic bilingual dictionaries in Japan, and suggested general and specific changes. For a general change, he pointed out that the number of headwords in Japanese-English dictionaries (i.e. for learners of English, primarily for encoding purposes) was considerably lower than that in English-Japanese dictionaries (for decoding purposes). He regretted this imbalance and suggested that a larger number of headwords be included in both types of dictionaries in the future. Especially, he is concerned with those who use Japanese-English dictionaries for decoding purposes, like learners of Japanese. Sharpe's suggestions for improvements have been almost completely dealt with in present-day pocket electronic dictionaries. Most models have sufficient coverage in the number of headwords both in English-Japanese and Japanese-English dictionaries. There is no imbalance in terms of the number of headwords depending on the types of bilingual dictionaries.

Sharpe (1995) also referred to some specific problems of electronic bilingual dictionaries. Some of them are concerned with specific issues in the treatment of Japanese kana/kanji characters, so we will not go into too much detail here. Suffice it to say that different methods of looking up English words by keying Japanese kanji or kana characters are somehow inherent problems of deciding on Japanese search terms and how to tell the machine to look for them, and thus it is not something that is drastically improved or changed via the dictionary interface. The latest machines, however, do have the functions of fuzzy search in Japanese as well, with which you can just type in either base forms or inflected forms, then the dictionary will find all the instances of inflected or morphologically derived forms.

5.2. De Schryver (2003)

De Schryver (2003)'s list is very long and detailed, so we will not repeat every check point here. Instead, I will pick up some important evaluation criteria from his framework and discuss the points by comparing his judgment against mine based on the critical evaluation of pocket electronic dictionaries in Japan.

5.2.1. Comparison with paper dictionaries

De Schryver (2003: 152) discussed the advantage of paper dictionaries over electronic ones. He claims that some aspects of the traditional paper dictionaries remain unbeatable and listed the following advantages in (1):

(1)
1. Familiar, reassuring
2. Symbolic value as a physical object that can be owned and admired
3. Easy to browse, can most readily be read recreationally, easy global reading, manhandling is part of the reading pleasure
4. Easy to read, best for the eyes
5. Easy to annotate, one can physically write on them
6. Durable, can be carried around the world without fear of serious damage or loss of functionality
7. Has a solid independent existence
8. Does not require a computer to be switched on

In his evaluation, none of the above could be achieved by any medium of electronic dictionaries (cf. De Schryver 2003: 153), but we believe that pocket electronic dictionaries in Japan can compare favourably with paper versions in some respects. For example, electronic dictionaries are becoming more familiar to younger generations in Japan, thus point 1 is not true any more for at least those who are born after the computer generation in the early 1990s. Also, owning a paper dictionary used to give a kind of prestige in Japan, too, but not any more. Rather owning a pocket electronic dictionary gives prestige. Everyone at senior high school has one now, so if you enter your son into high school, you are usually recommended by school teachers to buy a new pocket dictionary as a gift. Points 3 and 4 are still considered an advantage of paper dictionaries. However, the availability of full-colour TFT panels could make a huge difference in making the information in electronic dictionaries more accessible in colour.

Point 5, annotation, or putting down some necessary notes in the margin of the dictionary page, is also a unique feature of paper dictionaries, but this is again being replaced by electronic dictionaries.

There are now functions of putting personal study notes on the entries which you have looked for. You can mark the entry for a machine to remember the items for your personal study later on. There are even functions of creating some randomly generated vocabulary tests based on the marked items.

The last few points 6-8 are considered to be advantages for paper dictionaries over electronic dictionaries, especially CD-ROM dictionaries installed on PCs. In the case of pocket electronic dictionaries, however, these are not really a problem. Most electronic dictionaries available are either web-based or CD-ROM dictionaries, thus it is difficult to use them when PCs are not available or connected to the Internet. Pocket electronic dictionaries in Japan, however, do not have these problems. They can be carried around without a PC (of course, they do not work if their batteries are flat).

De Schryver (2003) went on to mention advantages of both paper and pocket electronic dictionaries in terms of the handheld ease. In his point 13, he claims that paper dictionaries have a low profile compared to electronic products, with pocket electronic dictionaries often considered to be mere gadgets or status symbols (de Schryver 2003: 155). As he argued, it should be noted that a gadget that is perceived as a status symbol may increase the people's motivation to purchase it. Therefore, in Japan, younger generations prefer to choose electronic dictionaries to paper ones, due to their prestige.

5.2.2. *The local disk ease*

De Schryver (2003) made a further comparison between pocket electronic dictionaries (PEDs) and other electronic dictionaries (CD, online and web dictionaries). Especially, he made favourable judgments for CD-ROM dictionaries regarding the following advantages (the numbers correspond to the ones used in his original article). In (2), points 14-22 are shown based on de Schryver (2003: 156), for all of which he gave three stars (***) to CD dictionaries.

(2)

	PED	CD
14. availability of audible pronunciation and sound files	**	***
15. takes very little space and has an extremely low weight	*	***
16. record-yourself facility	*	***

17. speedy access to D data	*	***
18. alternative ways of presenting information (e.g. computer graphics)	*	***
19. fuzzy search facility, multi-access, range of look-up routes, hyper reference	*	***
20. user customization; interactivity	*	***
21. highly user-friendly interface	---	***
22. copy-and-paste facility	---	***

This favourable judgment for CD-ROM dictionaries must not be taken at face value, for in most of the cases, CD-ROM dictionaries' advantages are those of PCs, not CD-ROM dictionaries per se. It is true that a CD is very light, and portable, but a CD does not work by itself. It always needs a CD-ROM/DVD drive installed onto a PC and a desktop PC is usually quite heavy. Even a laptop is much more bulky than a pocket electronic dictionary. Thus many of the grades given above should be reconsidered in light of the portability of accompanying hardware.

There are some other disadvantages of using CD-ROM dictionaries. One is a compatibility issue. The old Win95/98 versions of the CD-ROM dictionaries often do not work properly on Windows XP or Vista. Thus in many cases, users have to buy another copy of CD-ROM dictionaries if they continue to use the same title. Another problem is the compatibility problems across different CD-ROM dictionaries. It sometimes happens that if we install more than a couple of different CD-ROM dictionaries on the same PC, running one dictionary software causes a problem with another. Unless we have a sufficient amount of RAMs, each dictionary software takes up too many RAMs and runs out of them very quickly.

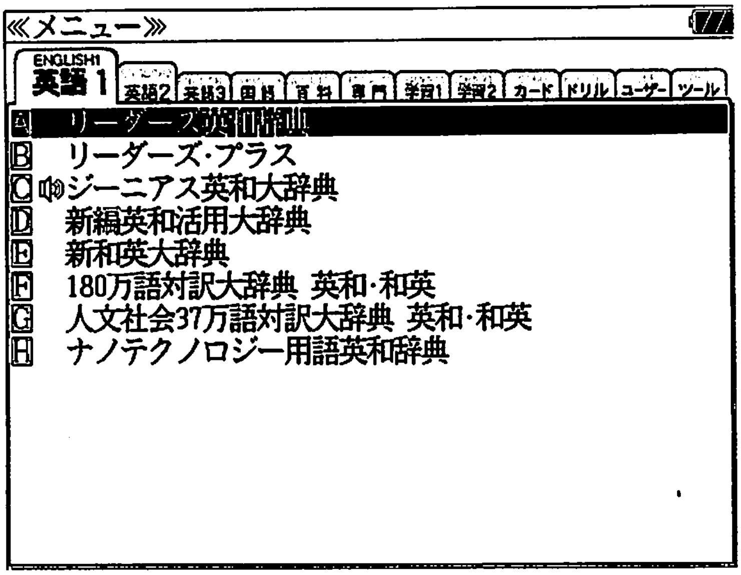
In contrast to these disadvantages of CD-ROM dictionaries, pocket electronic dictionaries are much superior. Now pocket electronic dictionaries have audible pronunciation and sound functions. You can hear the pronunciation of the headwords with authentic native speaker pronunciations, not the ones made by text-speech technologies. Most pocket electronic dictionaries are extremely light, approximately 200-300g. You could incorporate voice-recording functions, but in Japan it turned out that those functions were not as popular as the companies expected as a function of pocket electronic dictionaries, and they gradually stopped pursuing these audio-recording functions. Points 18-20 are also realized to some extent. Collared LDC displays make it possible to show the graphical information more vividly. Some pocket electronic dictionaries now have TV functions, thereby becoming truly multi-media. Different search facilities are now available, the efficiency of which we will discuss in further detail in the next section. Point 21, highly user-friendly interface, is rather controversial, because it is difficult to say exactly what is user-friendly and this depends largely on the situations and purposes of dictionary look-up by different user groups. Thus it is necessary to define the situation of dictionary use in a much more fine-grained way in order to evaluate user-friendliness objectively.

6. Functions unique to pocket electronic dictionaries in Japan

Here let us describe some functions that are unique to pocket electronic dictionaries in Japan. Since the current models contain at least 20-30 different dictionary titles in one machine, there are some functions to search across different titles in terms of definitions, translation equivalents, and illustrative examples. Some search functions are quite robust in that they search for all the related information in every title in the dictionary and easily jump to cross-referenced entries. Let us show the functions in detail.

6.1. The main menu

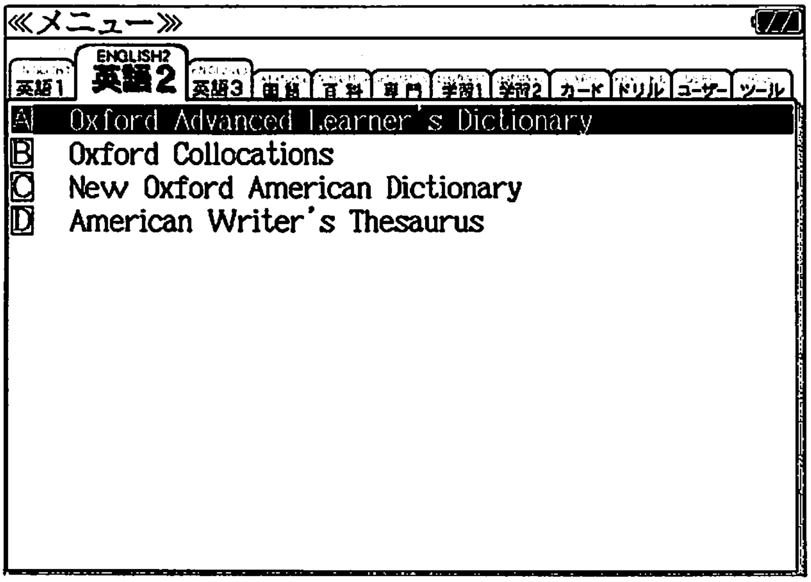
The title menu shows the list of all the contents in the dictionary. Figures 2.1 to 2.6 show the main menu of the model called SR-S9000 by SEIKO Instruments.


«メニュー»
ENGLISH1
英語1
英語2
英語3
国語
百科
専門
学習1
学習2
カード
ドリル
ユーザー
ツール

A リーダーズ英和辞典
B リーダーズ・プラス
C ジーニアス英和大辞典
D 新編英和活用大辞典
E 新和英大辞典
F 180万語対訳大辞典 英和・和英
G 人文社会37万語対訳大辞典 英和・和英
H ナノテクノロジー用語英和辞典

Figure 2.1. The main menu windows (English-bilingual).

A: E-J dictionary (c. 260,000 entries)
B: E-J dictionary (c. 260,000 entries)
C: E-J dictionary (entries)
D: Collocation dictionary
E: J-E dictionary
F: Sci-Tech Terminological dictionary (1.8 million entries)
G: Humanities & Social Sciences Terminological dictionary (370,000 entries)
H: Nano-technology E-J dictionary


«メニュー»
ENGLISH2
英語1
英語2
英語3
国語
百科
専門
学習1
学習2
カード
ドリル
ユーザー
ツール

A Oxford Advanced Learner's Dictionary
B Oxford Collocations
C New Oxford American Dictionary
D American Writer's Thesaurus

Figure 2.2. The main menu windows (English-monolingual).

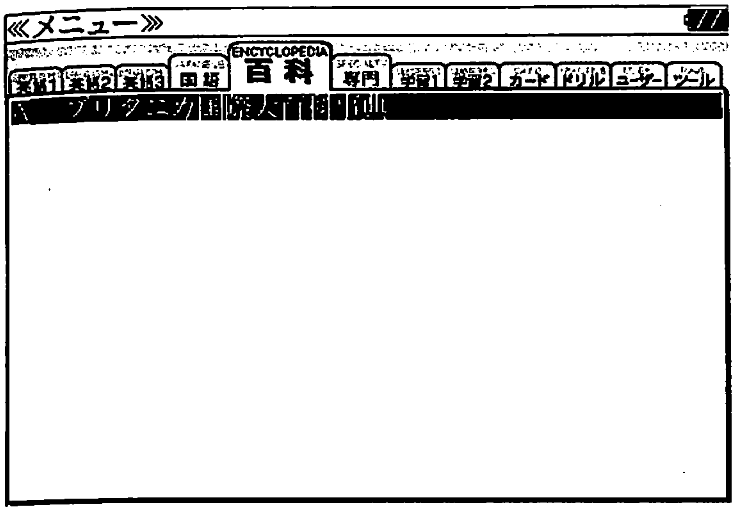

«メニュー»
英和1
英和2
英和3
国語
ENCYCLOPEDIA
百科
専門
学習1
学習2
カード
ドリル
ユーザー
ツール
A ブリタニカ国際大百科事典

Figure 2.3. The main menu windows (Britannica).

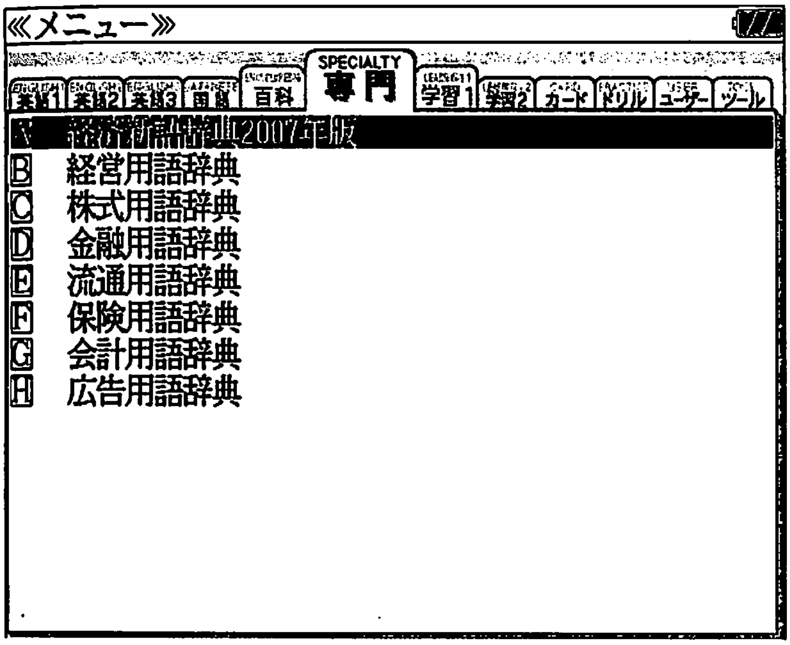

«メニュー»
英和1
英和2
英和3
国語
百科
SPECIALTY
専門
学習1
学習2
カード
ドリル
ユーザー
ツール
A 経済新語辞典2007年版
B 経営用語辞典
C 株式用語辞典
D 金融用語辞典
E 流通用語辞典
F 保険用語辞典
G 会計用語辞典
H 広告用語辞典

Figure 2.4: The main menu (Specialized dictionaries).

A: New words in economics (2007)
B: Dictionary of economics
C: Dictionary of stock market
D: Dictionary of finance
E: Dictionary of currency
F: Dictionary of insurance
G: Dictionary of accounting
H: Dictionary of advertising

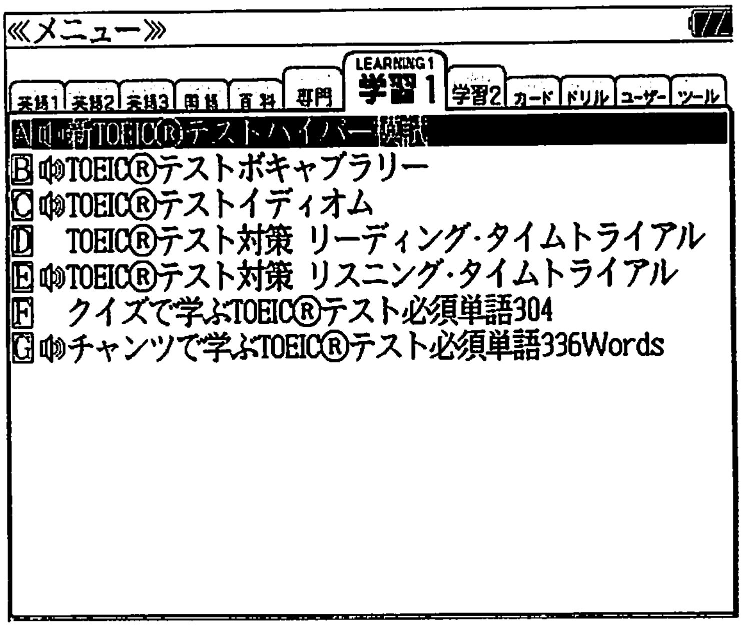

《メニュー》
英語1
英語2
英語3
国語
百科
専門
LEARNING 1
学習1
学習2
カード
ドリル
ユーザー
ツール
A 新TOEIC®テストハイパー模試
B TOEIC®テストボキャブラリー
C TOEIC®テストイディオム
D TOEIC®テスト対策 リーディング·タイムトライアル
E TOEIC®テスト対策 リスニング·タイムトライアル
F クイズで学ぶTOEIC®テスト必須単語304
G チャンツで学ぶTOEIC®テスト必須単語336Words

Figure 2.5. The main menu (TOEIC drill books).

A: TOEIC mock exam
B: TOEIC Test Vocabulary
C: TOEIC Test Idioms
D: TOEIC Test Reading
E: TOEIC Test Listening
F: TOEIC Vocabulary
G: TOEIC Vocabulary

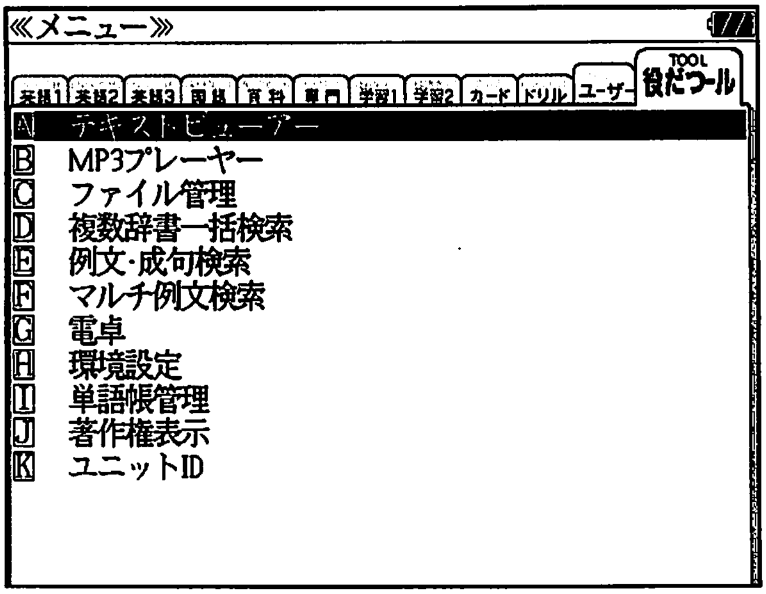
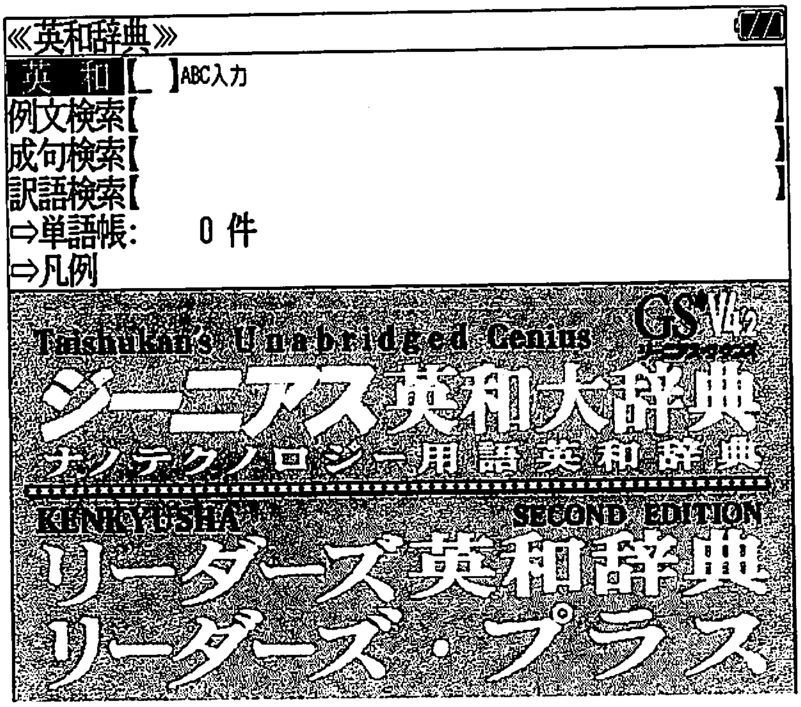

《メニュー》
英語1
英語2
英語3
国語
百科
専門
学習1
学習2
カード
ドリル
ユーザー
TOOL
役だツール
A テキストビューアー
B MP3プレーヤー
C ファイル管理
D 複数辞書一括検索
E 例文·成句検索
F マルチ例文検索
G 電卓
H 環境設定
I 単語帳管理
J 著作権表示
K ユニットID

Figure 2.6. The main menu (Utilities).

As one can see, there are major English monolingual and bilingual dictionaries (E-J and J-E), both unabridged and learners' dictionaries, along with various specialized dictionaries such as dictionaries of collocations, idioms, new words, terminologies in various technical fields among others. The contents are selected from the most popular printed dictionaries available on the market, and can be considered the best selections of major best-selling dictionaries. Since this model (SR-S9000) is a professional model for English teachers, it especially focuses on the rich collections of English dictionaries and bilingual resource books on conversation and vocabulary learning. If we are to buy each title separately in printed form, we need to pay twice or three times as much as this electronic version; thus it shows how cost-effective this model can be.

6.2. The search functions

For major pocket electronic dictionaries in Japan, it is a common function that the user can search for a given word across different dictionaries. When you key in the word in the search field (Figure 3.1), you will get the list of all the dictionaries that contains the search word as a headword (Figure 3.2). In Figure 3.2, the icons before the word *dictionary* in each line show the titles of the dictionaries available in the electronic dictionary. When you press the DOWN button, you can scroll the list and the entry of each dictionary will be highlighted and shown in the bottom panel. In this way, you can quickly browse the headword's contents in each dictionary and decide whether you want to move to that entry or not. After you decide, pressing the ENTER key will take you to the specific section of the entry.



《英和辞典》

英　和【_】ABC入力

例文検索【　】

成句検索【　】

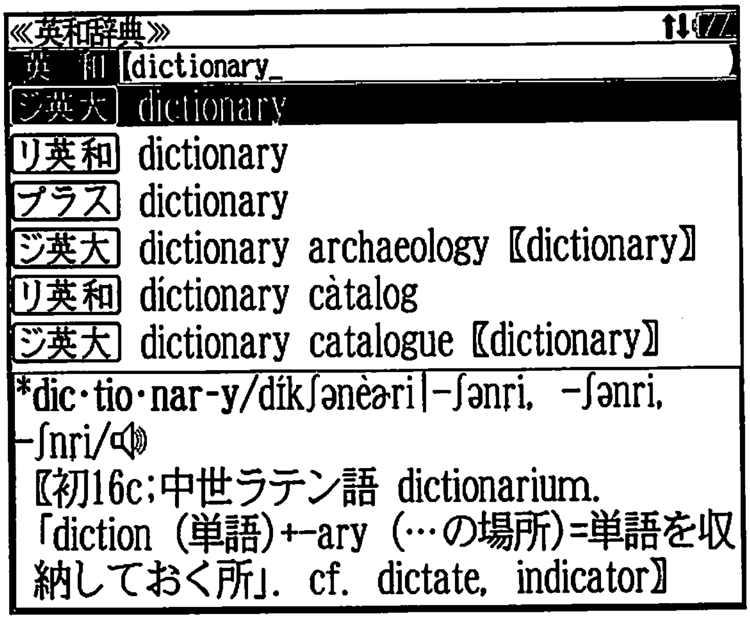
訳語検索【　】

⇨単語帳:　0 件

⇨凡例

Taishukan's Unabridged Genius
GS V4.2
ジーニアス英和大辞典
ナノテクノロジー用語英和辞典
KENKYUSHA
SECOND EDITION
リーダーズ英和辞典
リーダーズ・プラス

Figure 3.1. The search window for E-J dictionaries.



《英和辞典》

英　和【dictionary_】

ジ英大 dictionary

リ英和 dictionary

プラス dictionary

ジ英大 dictionary archaeology 【dictionary】

リ英和 dictionary càtalog

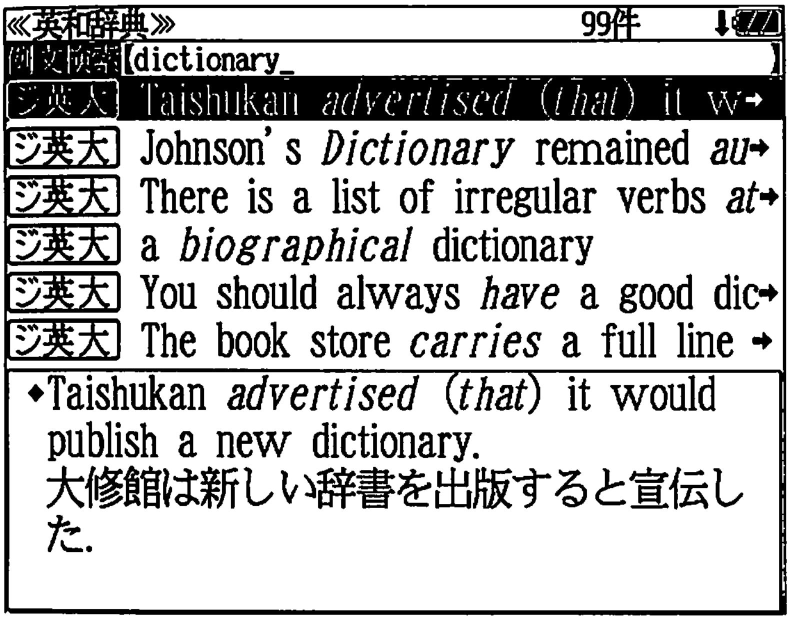
ジ英大 dictionary catalogue 【dictionary】

*dic·tio·nar-y/díkʃənèəri|-ʃənri, -ʃənri, -ʃnri/

【初16c;中世ラテン語 dictionarium. 「diction (単語)+-ary (…の場所)=単語を収納しておく所」. cf. dictate, indicator】

Figure 3.2. The results window for the search *dictionary*.

One search function that is unique to the pocket electronic dictionary in Japan is the so-called ‘example cross-search’, which will find all the instances of the search word in the illustrative example sections across different dictionaries contained in the machine. Figure 4 illustrates the results window of the example cross-search, in which all the instances of the search word *dictionary* are shown from different parts of all the dictionaries contained in a pocket electronic dictionary. This function is especially useful for language teachers who want to find appropriate examples for instructions from dictionaries. Sometimes it is not enough to look at the headword of the given word you want to look for. It would be nice to see all the examples in the dictionary in which the word is used. Many CD-ROM dictionaries have this function, but they are only limited to within their publications and very infrequently software can do the search across different dictionaries. Japanese electronic dictionaries, however, look for example sentences across both monolingual and bilingual dictionaries, which makes a very powerful search tool for finding good examples for teaching and learning.



[dictionary_]

ジ英大 Taishukan *advertised* (*that*) it w→

ジ英大 Johnson's *Dictionary* remained *au*→

ジ英大 There is a list of irregular verbs *at*→

ジ英大 a *biographical* dictionary

ジ英大 You should always *have* a good dic→

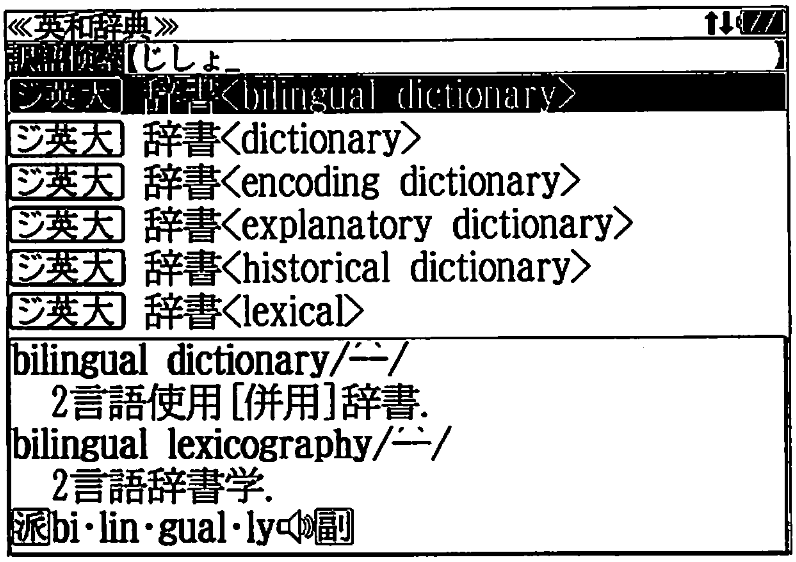
ジ英大 The book store *carries* a full line →

◆Taishukan *advertised* (*that*) it would publish a new dictionary.
大修館は新しい辞書を出版すると宣伝した.

Figure 4. The example cross-search.

Another unique search function integrated into a pocket electronic dictionary in Japan is the 'translation equivalent' search. See Figure 5 for an example. This is a function to search for words or phrases in the parts of the Japanese translation equivalents given in English-Japanese dictionaries. Thus, instead of searching for the English headwords in

English-Japanese dictionaries, one can search for a Japanese translation equivalent (for instance, '辞書*jisho*' i.e. dictionary) and obtain the results of the headwords or example sentences where that translation equivalent is provided. In Figure 5, when searching for the word '辞書', not only the headword *dictionary*, but all different entries for different types of dictionaries (bilingual dictionary, encoding dictionary, explanatory dictionary, historical dictionary, etc.) are obtained because these headwords contain '辞書' as a part of its translation equivalent. In this way, one can use English-Japanese dictionaries as another source of encoding besides Japanese-English dictionaries.



【じしょ_】

ジ英大 辞書<bilingual dictionary>
ジ英大 辞書<dictionary>
ジ英大 辞書<encoding dictionary>
ジ英大 辞書<explanatory dictionary>
ジ英大 辞書<historical dictionary>
ジ英大 辞書<lexical>

bilingual dictionary/ー/
2言語使用[併用]辞書.
bilingual lexicography/ー/
2言語辞書学.
派bi·lin·gual·ly 副

Figure 5. The translation equivalent search.

7. Pocket electronic dictionaries: user perspectives

7.1. Change in access structure

The advent of hand-held pocket electronic dictionaries has made several important changes in second language pedagogical lexicography in Japan. In this section, we will discuss some of the major changes and their implications for dictionary making and research into user perspectives as a discipline of metalexicography. One important change is in its access structure. Since one pocket electronic dictionary contains more than a dozen different titles, users first have to select dictionaries from the categories such as [Japanese monolingual], [English monolingual], [English-Japanese], [Japanese-English], among others. This is similar to choosing a dictionary from a bookshelf. The problem is that users do not often know which dictionary to consult. They do know the difference between English-Japanese and Japanese-English dictionaries, but they do not know the difference between an unabridged dictionary of English and a learner's dictionary. Under the section [English-Japanese], sometimes, an unabridged English-Japanese dictionary and an English-Japanese learner's dictionary are both available. In such a case, users tend to look up words in an unabridged dictionary without knowing a difference in types of the dictionaries available and cannot absorb all the information provided in the entry.

In order to make the distinction clear, some companies have the selection buttons labelled with the dictionary names. However, the dictionary names are not often familiar to the users. They do not know, for instance, whether *Genius Dai Eiwa* (i.e. the *GENIUS Unabridged English-Japanese Dictionary*) is the same as *Genius Eiwa* (i.e. the *GENIUS English-Japanese Dictionary*), which happens to be smaller than the unabridged version. Thus, the labelled buttons can sometimes be misleading to the users.

Other manufacturers try to make the buttons as simple as *Eiwa* (i.e. English-Japanese) / *Waei* (i.e. Japanese-English), which is all right if the titles are only limited to one major dictionary. However, it often happens that more than one dictionary is available under the *Eiwa* section and the users will not know which one to choose.

This is an issue of mega-structure of a dictionary. In order to find the necessary information in a dictionary, you are supposed to know how to retrieve what you are looking for from a particular place in a dictionary. The term mega-structure is used to describe the overall architecture of a dictionary. It used to be the term for a single dictionary covering the information in the front and back covers, the front matter, the articles inside the text, the back matter, and so on. With the appearance of pocket electronic dictionaries, it implies not only the choice of one dictionary but also the choice of different types of dictionary, followed by the selection (or non-selection) of a particular dictionary title.

7.2. Change in user reference behaviour

The advent of pocket electronic dictionaries has changed user behaviour in a significant way. For example, the choice of dictionaries is now based on totally different criteria. People are not interested in individual titles any more. They choose pocket electronic dictionaries by looking at the list of titles in its entirety. Beginners and ordinary users prefer 'the more, the better'. Thus the product containing more than 100 titles sell most among these people. More skilled users look for the products containing the range of reliable, good pocket electronic dictionaries. It is interesting to note that their choice is heavily dependent on the choice of monolingual English dictionaries such as the *COBUILD* or the *Oxford* series. In the case of high school models, it is still largely teachers' recommendation that counts. Overall, a new pattern of dictionary choice or preference has emerged, due to the appearance of pocket electronic dictionaries.

Users also tend to look up more words in electronic dictionaries than in paper dictionaries (Koyama/Takeuchi 2003, 2004), because looking up words in electronic dictionaries is much easier and quicker. It is a good thing that users become familiar with using a dictionary while reading. It is definitely true that electronic dictionaries make the use of dictionaries more accessible to ordinary users. This frequent look-up in electronic dictionaries, however, could sometimes be problematic. Users become impatient and jump to a dictionary too quickly while reading. It is sometimes necessary to figure out the meaning from the context. At least in a proper process of reading, it is important to absorb the context and make a preliminary guess from the context and then consult a dictionary to check whether the guess is correct. This will help to search for the meaning in several different senses more efficiently. Jumping to an electronic dictionary sometimes hinders this process from taking place properly when reading.

7.3. Information overflow?

After my introduction of pocket electronic dictionaries in Japan, some readers might question the value of placing the large number of titles into one machine. Does this result in information overflow? Isn't it against the user-friendliness in a true sense? My answer to this question is YES and NO. For some users, too many dictionaries can sometimes cause a problem. What types of users? From my experience, it is a medium-level user that is motivated enough to start exploiting the information in the electronic dictionary, but with little prior knowledge. Complete beginners do not see any problem, for they do not use so many different dictionaries anyway. They only stick to the section of English-Japanese dictionaries all the time, for instance, and do not know what other dictionaries are available for what purposes. Skilled users can tell which dictionary contains what information, thus selecting a dictionary properly for what they need. The most problematical one is the intermediate-level user, who is beginning to exploit a dictionary to the full, but needs more basic skills. Thus this group of users tend to select wrong dictionary categories, select wrong search modes, or select more than one category and become confused. As Tribble (2002:184) noted, "very few read manuals or instructions, preferring to click on anything that moves or flashes – and giving up in disgust if the program fails to do what they want it to do straight off." Lower intermediate-level users often tend to show this tendency. They are not totally ignorant, but as they try to take advantage of the electronic dictionary, they become more confused or exposed to wrong information.

Still, there is a strong tendency for people to look for 'all-in-one' models. This is partly because users want to feel secure. They do not know what problem they will encounter in the future, which makes them want to possess an electronic dictionary which can provide answers to all sorts of problems with one machine. It is also because a decent pocket electronic dictionary is still rather expensive; people do not want to buy a new one so often. This is similar to the traditional tendency of less advanced learners looking for all-inclusive dictionaries because they do not want to buy a new dictionary again. This tendency is understandable, but causes another problem. Users buy 'all-inclusive' models without knowing their proper reference skills level. This means that the electronic dictionary provides too much information from too many sources, unless they are provided with a proper instruction or training of dictionary use (cf. Park 2006). I think that while it is all right to recommend all-in-one models for ordinary people, we definitely need a set of proper guidance regarding the use and selection of dictionaries for different reference needs.

7.4. Issues in second language vocabulary learning with dictionaries

As the use of pocket electronic dictionaries becomes more and more popular in Japan, there is a growing renewed interest in the issue of second language vocabulary learning and acquisition with the use of a dictionary. Koyama and Takeuchi (2003; 2004), for instance, found that it is generally true that with electronic dictionaries, the subjects had more look-ups and did the reading faster. However, there was no difference in the retention of words looked up immediately after the task. One week later, there was a better recall of words with paper dictionaries than with electronic dictionaries. This implies that electronic dictionaries are very easy and quick in looking up a word, but they may not help students learn the words they looked up.

It seems reasonable to assume that more look-ups with electronic dictionaries will lead to more extensive reading, but it is still an open question whether this extensive reading will lead to more learning of unknown words in the text. As some research shows (cf. Hulstijn/Laufer 2001), in order to acquire a word, one needs to have a deeper processing of lexical knowledge. Easy access and easy solution by electronic dictionaries might not help this process, compared to paper dictionaries. There is a growing awareness that a pocket electronic dictionary is useful for a quick check of meaning while reading, but that it may not always be as good as paper dictionaries for detailed reading of the entry while preparing for the class or doing homework. In paper dictionaries, you can mark and underline the important information in the entry. This kind of absorbing the information by reading and marking on paper can lead to deeper processing and better learning. Thus, some English teachers recommend paper dictionaries for self-study at home, and electronic dictionaries for in-class reading for a quick check of meaning.

Of course, these issues are closely related to reference skills and therefore, proper skill training of pocket electronic dictionaries will be worth trying and it would be important to do empirical research on the effects of such training on different reference activities.

8. Conclusion

In this chapter, I have argued that the growing new product category of pocket electronic dictionaries in Japan and Asian countries has posed a very interesting question to us regarding the interrelation between the mega-, macro- and micro-structures of different dictionaries in one model. Despite its innovative features, the contents of most pocket electronic dictionaries so far are the same as printed dictionaries. As de Schryver (2003) mentioned in his dreams, fully customized original contents for electronic dictionaries should come into existence in the near future. It is ironic that most electronic dictionaries in Japan rely on the contents provided by printed dictionary publishers because people want the names of those famous dictionary brands. They could come up with their own original electronic dictionary contents, but people prefer to have a 'brand' dictionary in it. Here again the sociology of dictionary use is involved. Therefore, we may need a hybrid of printed and electronic versions in the sense that while taking advantage of the reliable contents of printed dictionaries, innovative search functions or dynamically adjusted user interfaces could be achieved.

The future of pocket electronic dictionaries would be more integrative in nature. There will be a fuzzier boundary between PDAs, palm-top PCs, mobile phones and pocket electronic dictionaries. Especially computer games like Nintendo DS will challenge the value of having an independent electronic dictionary. More and more integration and competition will take place. In the meantime, it is definitely necessary to investigate what aspect of reference behaviour should be reinforced in order to achieve the goal of reference acts in the light of specific linguistic or practical reference needs.

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